ILLUSTRATED
ELECTRICAL REVIEW
A Journal of Scientific and Electrical Progress.

VOL. 26. No. 4. WEEKLY. | NEW YORK, WEDNESDAY, JANUARY 23, 1895. | $3 per Annum. Single Copies, 10 Cents.

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Entered at Post Office, New York, as Mail Matter of the Second Class.

VIEWS, NEWS AND INTERVIEWS.

There are now employed at the Schenectady works of the General Electric Company about 3,200 hands and at Lynn about 1,600 hands, as compared with a regular working force a year ago of 1,300 at Schenectady and 800 at Lynn.

There are but two horse cars now in service on the street railways of Cleveland, Ohio. These are popularly known as the Superior street and Payne avenue "dinkies." They rattle along the cable lines after midnight. Every hour they leave the Public Square, but the tinkle of the bells is heard only by the belated traveler or the wakeful citizen along the cable lines. These cars are also known as the Superior and Payne avenue "sleepers." It is the custom of many of the regular patrons to curl up on the cushions and go to sleep the moment they touch the seats. It is then the duty of the conductor to gently awaken them when he enters the car to collect the fares. This duty discharged, he is to pilot them safely to the street for which they are bound, stop the car and go and shake them until they awake, hand them out of the car and drive on. This duty is sometimes omitted, for the conductor forgets to find out before the passenger goes to sleep where he wishes to get off. Thus arises a frequent cause of trouble. The conductor-drivers are usually prepared for this, and if the passenger shows signs of belligerency he is reduced to calmness.

Telegraph lines throughout the world aggregate 1,069,123 miles; of these America has more than half, 548,822 miles; Europe, 382,937; Asia, 67,875; Australasia, 47,812; and Africa, 21,687 miles.

Mr. J. W. Marsh, vice-president and general manager of the Standard Underground Cable Company, of Pittsburgh, was in Baltimore the other day in consultation with the promoters of the Susquehanna River Electric Company. Mr. Marsh has accepted the presidency of the last named company and will be elected at the next meeting of incorporators. Surveys of the route to be followed by the Susquehanna River Electric Company are now being made by a corps of engineers. The company will be capitalized for $6,000,000, of which $3,000,000 will be in stock and about the same amount in five per cent interest-bearing bonds.

The Pierce County, Wash., Power and Telegraph Company has been incorporated by A. J. Hayward, M. B. Hayward, his son, and A. F. Eastman, his son-in-law, with a capital stock of $1,000,000. It is proposed by the company to dam the Nisqually River, and, with the power thereby secured, to operate a large electric power plant to supply the city of Tacoma, Wash., with electricity.

According to the latest returns (1892), Norway is the country in which the smallest number of telegraph messages are sent, and Great Britain in which the telegraph is most used. The messages average 1.8 a head in the United Kingdom, and slightly under one a head in the United States and France. In Russia they average only .04 per head of population.

THE COTTON STATES AND INTERNATIONAL EXPOSITION.

ITS ELECTRIC LIGHTING EFFECTS AND OTHER INTERESTING FEATURES.

The accompanying illustrations give a bird's-eye view and a view of the Electricity Building of the Cotton States and International Exposition, which will be held at Atlanta, Ga., from September 18 to December 31 of the present year. Arrangements for the finest exposition ever held in the South are now fairly under way, and it is satisfactory to note that electricity will play a large part in the success of the exposition. Geographically and commercially Atlanta is the proper place to hold a Southern exposition. The Atlanta *Constitution* recently published a map which showed that the city of Atlanta bisected lines drawn from Boston to the city of Mexico, from Chicago to Havana, and from Minneapolis to Jamaica. As a result of this, Mr. Clark Howell, of the *Constitution*, has been described as "the man who invented the map which showed that anybody starting from any point in

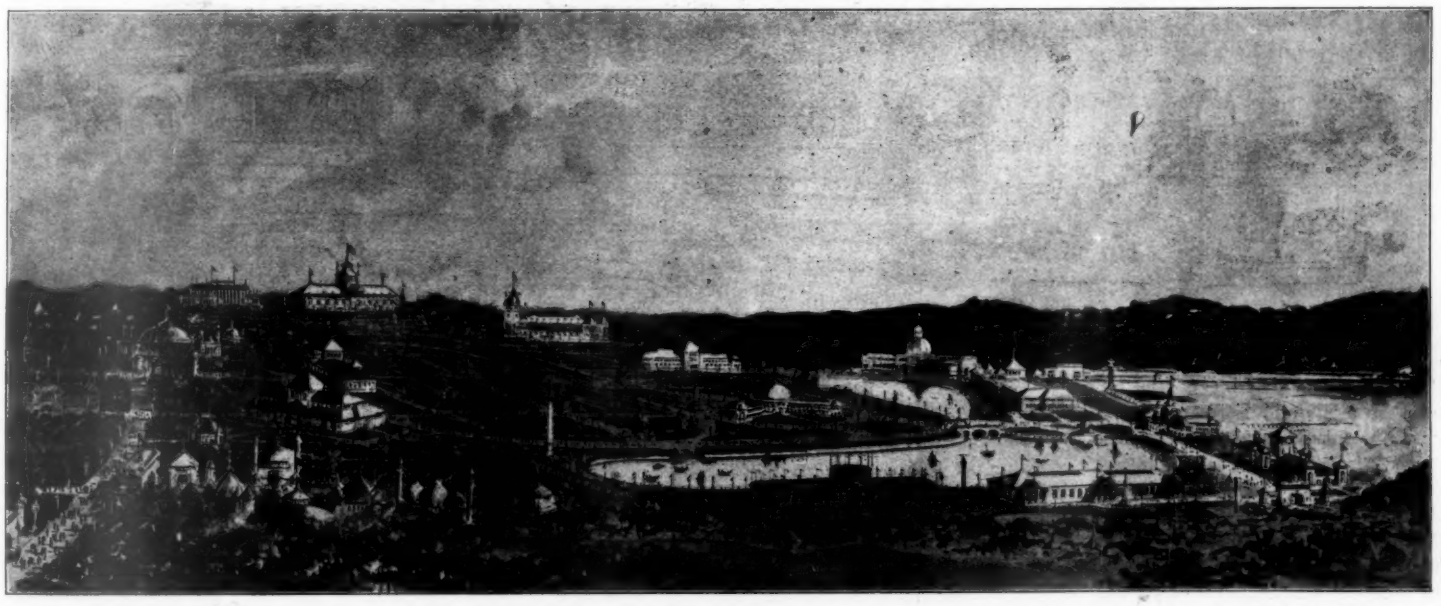


FIG. 1.—BIRD'S-EYE VIEW OF THE COTTON STATES AND INTERNATIONAL EXPOSITION TO BE HELD AT ATLANTA, GA., SEPTEMBER 18 TO DECEMBER 31, 1895.—ELECTRICAL BUILDING ON THE RIGHT BACKGROUND, UPPER END OF LAKE.

this hemisphere to go to any other point must pass through Atlanta." The electric railway men who were so hospitably entertained at Atlanta during the recent meeting of the American Street Railway Association will undoubtedly agree with the ELECTRICAL REVIEW that Atlanta is the most progressive city in the South, and has been selected with perfect propriety for the carrying out of this great exposition.

Piedmont Park, which is situated on the outskirts of Atlanta and covers about 190 acres, has been chosen as the location for the buildings of the exposition. A glance at the bird's-eye view will show the natural attractiveness of the place. The United States Government has given its approval of the exposition, and has made an appropriation for a government building and exhibit. The floor area of this building will be about 50,000 square feet, not including an annex. Besides the Government Building, the other buildings will gether with many new entertainments. Over $300,000 has already been spent in preparing the grounds, and $150,000 more will be expended to complete this work. The probable total cost of the exposition will be fully $2,000,000.

Mr. C. A. Collier, a well-known banker, is president of the Exposition company, and working with him are such men as Clark Howell, of the Atlanta *Constitution*, W. H. Venable, Joseph Thompson, E. A. Hemphill, R. B. Bullock, E. P. Howell, Grant Wilkins and Mr. J. H. Allen, of *Dixie*.

Mr. Grant Wilkins, the chief of construction for the Exposition company, has submitted his estimates for the lighting of the grounds and the buildings. For the grounds proper, using 2,000 candle-power arc lights and placing them 100 feet apart, 465 would be required. Inside the buildings the lights are to be placed 50 feet apart; giving one and one-quarter candle-power for every square foot of space, 236 will be required. One

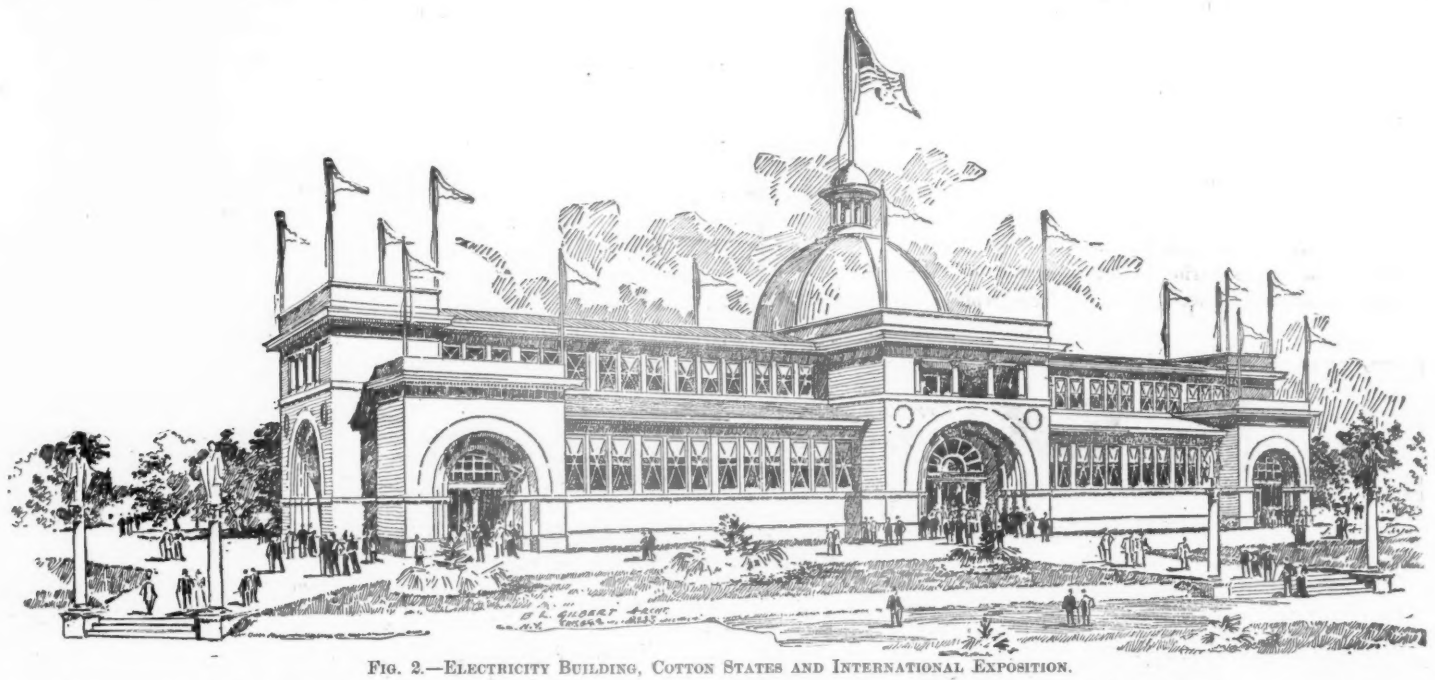


FIG. 2.—ELECTRICITY BUILDING, COTTON STATES AND INTERNATIONAL EXPOSITION.

be Manufactures and Liberal Arts, 216x370 feet; Machinery, 100x500 feet; Minerals and Forestry, 80x220 feet; Agriculture, 150x300 feet; Electricity, 91x250 feet; Transportation, 126x420 feet; Women's Building, 110x220 feet; Fine Arts Building, 100x260 feet; Negro Building, 100x300 feet. The sizes of the Tobacco Building, the Georgia State Building and the Administration Building have not yet been decided upon.

Many of the South American nations have evinced their interest in the exposition, and will undoubtedly send exhibits. Among European nations Italy and Austria will be represented. The Southern States have taken hold of the matter unanimously, and their various exhibits will constitute one of the most prominent features.

A portion of the grounds, to be known as "The Terraces," has been set aside to be used for amusement purposes, and the best features of the Midway Plaisance at the World's Fair and the California Midwinter Fair will here be shown, to-

hundred and twenty-eight arc lights would be required for lighting "The Terraces," where the amusements will be located. To illuminate the cornices of buildings and the edge of the lake, so as to give a fine electrical effect, 10,700 lights, 16 candle-power each, would be required. This will necessitate for the arc lights 664 horse-power, for the incandescents 1,070 horse-power, allowing 25 per cent for contingencies, the estimate of horse-power actually used being 2,166, but the building of a 3,000 horse-power plant is recommended so as to give an ample capacity. Eight hundred and twenty-nine arc lights and 10,700 incandescents will, therefore, be required. Mr. Wilkins recommended that the furnishing of the 128 arc lights for "The Terraces" be let as a concession.

Mr. J. H. Allen, chairman of the Machinery Committee, has in view a steam plant of 5,000 horse-power, which will probably give ample margin for contingencies. This steam plant will be of an educational character, embracing all the important types of steam engines. It is proposed to put the manufacturers on a basis of equal competition, and Mr. Allen believes this will make the exhibit even more profitable to them than the one at the World's Fair.

OBITUARY.

Clarence Miller, who has been connected with the Western Union Telegraph Company, in Albany, N. Y., for many years, died on January 15.

Mr. Alexander H. Bauer, chief electrician for the Pullman Palace Car Company, died in New York city on January 15 of Bright's disease. He was born in Baltimore in 1848. During the Civil War he was a Baltimore and Ohio telegraph operator at stations in the Shenandoah Valley. The next 17 years he spent as chief operator and manager of the Gold and Stock Telegraph Company in Baltimore, and as manager of the Mutual Union Telegraph Company of Baltimore. In 1882 Mr. Bauer became electrician for an electrical manufacturing company in his native city, and the next year was sent to England to study storage batteries, his visit doing much to bring about their extensive use in this country. He became in 1885 Boston manager for the Baltimore and Ohio Telegraph Company, and two years later went with the Pullman company. A system of lighting trains by an engine and dynamo situated in the baggage car was devised by him and is now in use on many Pullman trains. Mr. Bauer was a prominent member of the American Institute of Electrical Engineers. A wife and one son survive him. The funeral occurred at Baltimore last Thursday.

Assignment of the La Roche Electric Works.

At the annual meeting of the stockholders of the La Roche Electric Works, held at their office in Philadelphia on January 9, it was decided that it would be advisable for the company as a corporation to go into liquidation. The company made an assignment to J. Franklin Stevens, who has issued the following statement:

While the company has had an unusually successful career from a manufacturing standpoint, it was decided that they had insufficient capital to meet the demands of an increasing trade, and as the condition of the financial world to-day is such that it is a practical impossibility to obtain capital for a manufacturing corporation, it was deemed advisable to liquidate while the company was still solvent and accept certain propositions which have been made them.

Pending the consummation of these negotiations, it was deemed advisable to preserve the assets of the company intact and therefore an assignment was made to J. Franklin Stevens, former secretary and treasurer of the company. The assignee states on behalf of the company that there are ample assets held in trust by him to liquidate the claims of all creditors in full and leave a very handsome surplus for the stockholders. Notwithstanding the fact that the greater portion of the indebtedness is for money advanced by the members of the organization, no preferences were given, and an honest, straightforward settlement is assured.

M. F. A. La Roche, well known throughout the electrical world as the inventor and manufacturer of the efficient La Roche dynamos and motors, having associated with himself certain gentlemen of undoubted financial standing, proposes to purchase the entire equipment of the La Roche Electric Works, and will continue the business with increased facilities. For the present the manufacture will be continued at the factory of the La Roche Electric Works, American and Diamond streets, Philadelphia, until more commodious quarters can be obtained. The La Roche system, so well and favorably known as a system of lighting and power transmission, will in his hands remain intact, and the present high standard maintained as the best modern practice may dictate.

New York Electrical Society.

The 164th meeting of the New York Electrical Society was held at Columbia College, Tuesday evening, January 22. Mr. Edward Powell Hopkins, a lantern expert, delivered a lecture on "The Electric Light in Lantern Projection."

For Puddin'head Johnston and the Telegraph Operators.

If you pick up a starving dog and make him prosperous, he will not bite you. This is the principal difference between a dog and a man.—*Puddin'head Wilson's Calendar.*

THE BROOKLYN TROLLEY STRIKE.

The Greatest Tie-Up Since the Introduction of Electricity—Six Thousand Employees Become Strikers.

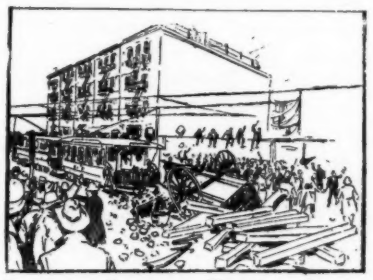
EVERY LINE BUT ONE IN THIS CITY OF OVER ONE MILLION INHABITANTS STOPS RUNNING FOR THREE DAYS—THEN SOME OF THE MEN RETURN, OTHERS REFUSE AND THEIR PLACES FILLED—THE POLICE UNABLE TO PROTECT THE COMPANY'S PROPERTY AND THE MILITIA ORDERED OUT SEVEN THOUSAND STRONG—SCENES OF DISORDER—CARS STONED, NEW MEN ASSAULTED AND KIDNAPPED AND THE CITY IN GREAT SUSPENSE FOR OVER A WEEK—BETTER PAY AND SHORTER HOURS AND DICTATION OF NUMBER OF "TRIPPERS" ARE THE DEMANDS OF THE STRIKERS.

As announced in the ELECTRICAL REVIEW last week, all the trolley lines but one in the city of Brooklyn were tied up by the strike of conductors and motormen, some 6,000 in number, which occurred Monday morning, January 14. The strike was most complete, and the first two days, with the exception of an occasional United States mail car and a few cars in Court street, not a wheel turned, and the elevated roads of that city did the greatest business in their history. Then new men were gradually secured and line after line opened up, but very slowly, as the police of Brooklyn could not guarantee protection.

The reasons given for the strike are: First, an increase was asked from $2 per day as at present to $2.25 per day; second, a change in the interpretation of the 10-hour law of the State that would reduce the work of the men; and third, a reduction in the number of "trippers" to one-fourth the number of full trips. These demands were refused, and the strike committee of the Knights of Labor ordered the tie-up. The Smith and Jay street line, H. W. Slocum, president, was able to reach an agreement with its men and its service continue—one small road out of a total of 49.

On Thursday, through the State Board of Arbitration, the strikers accepted the terms expressed in a letter from President John N. Partridge, of the De Kalb avenue and Franklin avenue lines, and opened up with all the old men. The letter in plain terms declines the increase demanded by the men over their wages of 1894, and only partially granted the request to reduce the number of "trippers." There has always been a good feeling between the employés and the officials of this well-managed company, and this, no doubt, explains their eagerness to return.

The electricians at the different



BLOCKADES PLACED IN FRONT OF BROOKLYN TROLLEY CARS.

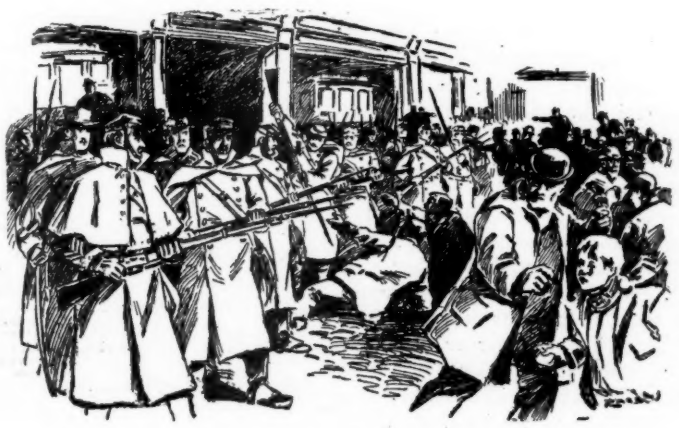
power houses were laid off, the companies fearing, it is said, that sympathy with the strikers might induce some of them to damage the valuable machinery. New men were engaged, and gradually the number of running cars increased, under protection of the police, later assisted by the militia.

On Tuesday, the second day of the trouble, the strikers became restive and commenced to stone the cars and assault the new employés, and these disorderly acts increased as additional lines were opened up. Numerous riots occurred, and many instances of outrages perpetrated are reported in which the police failed to interfere, plainly showing sympathy for the striking men. The new men were bought off, kidnapped and their railroad fare paid back to the cities they came from; in other cases they were threatened and beaten, and a general guerilla warfare occurred along the various lines partially equipped with cars Thursday, Friday and Saturday.

Some trolley wires were cut Saturday, but the guarding of the power houses and the patroling of the lines by the militia prevented much of this vandalism. A favorite act of the strikers was to throw stones at the trolley wheel and disconnect it from the wire, and then stone the car and the conductor while he endeavored to replace it.

Friday night Mayor Schieren, realizing that his police force could not properly guard the city and at the same time protect the widely distributed property of the companies, called out the militia, and the Second Brigade, composed of some 3,000 men, under command of General McLeer, promptly responded Saturday morning. All of these forces have headquarters in Brooklyn. The different depots were guarded by the militia, and the police guarded the cars en route and the streets along which they passed. Despite this fact the cars did not move with any degree of regularity, although the presidents had claimed that they had enough men engaged to run on their old schedule if they could be assured of protection.

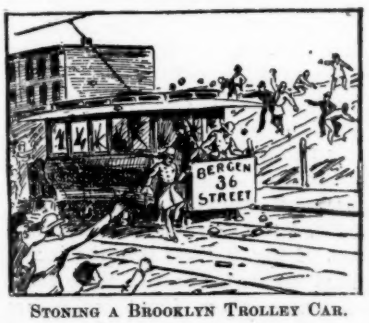
The crowds along the different streets were very large and daring Saturday and Sunday. Whenever the cars became blocked, which happened very frequently, they would endeavor to coax the new men to leave the cars, and sometimes with success. On other occasions strikers jumped on the cars and threw the new employés into the streets. Stones were thrown and in the afternoon a number of trolley wires were cut. It was a very lively day indeed, and, despite the vast amount of protection, none of the companies yet dared to run their cars after dark, although they had early in the day declared their intention of so doing.



MILITIAMEN HOLDING A MOB OF BROOKLYN STRIKERS AT BAY.

Sunday night the First Brigade of New York city was called out, and nearly 5,000 additional militiamen marched over to Brooklyn Monday morning. Mayor Schieren issued a proclamation directing all citizens to refrain from assembling in crowds.

Presidents Norton, Lewis and Wicker of the leading lines state it is now absolutely too late for any com-



STONING A BROOKLYN TROLLEY CAR.

promise; they must conduct their own business without dictation.

On Monday night several serious collisions occurred between mobs of strikers and the militia and police. Members of the Seventh Regiment were compelled to fire at the strikers. The situation looked serious at the time of going to press.

A Criticism and a Challenge.

[*From Electricity.*]

For years he (W. J. Johnston) has carried along nearly all the bankrupt concerns in the business, depending upon his good-paying customers for enough profit to enable him to carry without returns all their dead-beat competitors. The pages of the *World* are full of these concerns, many of whom have not paid a dollar in a year. Once in a while, when one of them fails, we learn the facts beyond dispute. Not many months ago one of them offered to give *Electricity* an advertisement on the same terms as he got from the *World*—he said he had not paid a dollar in three years. He said, also, he had tried the ELECTRICAL REVIEW, and they had not treated him fairly—they sued him for his account when long overdue.

Let any sound concern in any line of business scan the pages of the *World* and see if most of its bankrupt competitors are not occupying equally desirable positions with its own advertisement.

His statement of total circulation is a lie, and we challenge him to produce the names of 4,000 *paid subscribers*—people who have paid an annual subscription to the *Electrical World* within twelve months.

We will wager $200 that he cannot produce this list, the winner to pay the $400 into the treasuries of the A. I. E. E. and the N. E. L. A., evenly divided.

Two "Samples" Came to Us—And We Still Survive!

TO THE EDITOR OF ELECTRICAL REVIEW:

I notice a practical demonstration of the circulation methods of your brother publisher, Mr. Johnston, having received no less than five copies of his issue of January 5 marked "sample copy." This is in addition to the regular copy—free—that comes to this office. If his claim is true that he printed 17,000 copies of the *World* of that issue, and has five extra copies to send to each subscriber, what does his regular paid subscription list amount to?

I would like to know if other New England offices received extra "samples," too. ADVERTISER.

Boston, January 16, 1895.

Electric Light Companies Elect Officers.

Columbus, O., Electric Light and Power Company—Directors, William Monypeny, E. T. Mithoff, A. D. Rodgers, A. G. Patton, Franklin L. Perin, T. P. Gordon and L. C. Newsom. Olean, N. Y., Electric Light and Power Company—President, J. V. D. Coon; vice-president, Wm. M. Irish; secretary and treasurer, George Fobes. Utica, N. Y., Electric Light Company—Directors, H. D. Pixley, M. Jesse Brayton, W. E. Lewis, R. T. McDonald (Fort Wayne, Ind.), T. Solomon Griffiths, Joseph Fox (New York), H. M. Scheuch. Officers: President, H. D. Pixley; first vice-president, R. T. McDonald; second vice-president, W. E. Lewis; secretary and treasurer, M. Jesse Brayton.

Means for the Renewal of Electrode Surface in Telephony.

To the Editor of Electrical Review:

Shortly after the discovery of the microphonic principle by E. Berliner in the United States, and Professor Hughes in England, numerous experimenters became aware of the rapid deterioration of the carbon points, or metallic disks, employed as vibratory electrodes in transmitting instruments. In the Blake transmitter, containing a non-fusible platinum electrode in connection with a carbon button, this trouble was supposed to have been avoided. Practical experience speedily proved this assumption to be quite erroneous; in fact, the peculiar hissing and frying noises, so frequently observable in Blake transmitters, are largely due to the arcing between the electrodes.

As early as March 8, 1881, Mr. Blake sought to remedy this evil (see United States Patent, No. 238,557) by bridging the electrodes with a small resistance coil. A much more promising idea was developed by E. T. Greenfield in his United States Patent, No. 246,756, September 6, 1881. The invention consisted in arranging the carbon disk of a commercial Blake instrument so that it could readily be turned; in other words, whenever a certain portion of the polished carbon surface had become injured by burning, it was only necessary to move the button to obtain another perfect surface. Another plan consisted in shunting the electrodes by introducing a condenser (United States Patent, No. 281,895, July 24, 1883), which is, of course, nothing but an obvious imitation of the arrangement used for many years in connection with the Rhumkorff coil.

Messrs. Mercadier and Anizan have gone back to the employment of resistance coils between the electrodes, but for a slightly different purpose.

None of the above described methods have ever been adopted for commercial instruments. In fact the manufacturers of the English, French and German solid carbon electrode transmitters do not seem to have paid any attention to the provision of means for renewal of deteriorated electrode surface in transmitters.

The reason for such inattention is evident. Immediately after the discovery by Hunnings of the excellent qualities of powdered or granular carbon as a current varying material, and the greatly increased transmitting power of instruments employing powdered carbon as one of the electrodes, the majority of inventors turned their attention to the new star that had risen, and since then a vast number of so-called improved Hunnings transmitters have seen the light of day in the various patent offices.

It is not quite so apparent why for many years the English and German Post and Telegraph administrations have been satisfied to use carbon pencil transmitters without means for a speedy renewal of the surface contact of electrodes. This inactivity may well be laid to the proverbial conservatism of these administrations. Our recent Chicago Exposition, however, has demonstrated that French electricians are fully alive to the importance of this matter.

Prior to describing the method disclosed by the French inventors, it may be well to refer to an adjustable microphone, shown and described in the London *Electrical Review* of April 25, 1894, page 203, which instrument is said to have been invented by W. H. Soulby, of London, England. In connection with this subject it should be stated that extreme sensitiveness is claimed for such inaccurately styled "adjustable" microphones. A similar device was described and illustrated in the same journal, and is the invention of R. Damseaux.

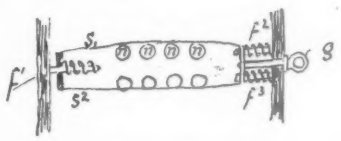


Fig. 2.—Mercadier and Anizan's Transmitter.

Messrs. Mercadier and Anizan's transmitter, exhibited at Chicago, is shown in the subjoined drawings. The diaphragm is a plate or disk of glass, whose characteristic tone is higher than the highest sound in the human voice. This arrangement prevents any phasal retardation of the electrical waves. As the focus of the vibrations or the point of maximum motion is at the center of the plate, the inventors attach to the center two small carbon prisms P^1 P^2, well insulated from one another. As is shown in the drawing, these prisms are socketed to receive the head of a small carbon cylinder or pencil *n*. The lower end of these pencils is enclosed in a metal block *b*, having a conical bore at its lower end, into

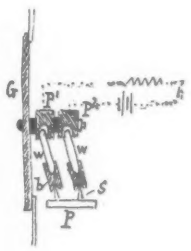


Fig. 1.—Mercadier and Anizan's Transmitter.

which projects a needle point, carried upon an adjustable metal plate *p*. It is evident that by moving *p*, the pressure of the carbon cylinders upon the prisms P^1 P^2, etc., may be regulated within wide limits. Besides this regulating device, Messrs. Mercadier and Anizan provide a novel means of renewing the deteriorated surfaces of electrodes. An examination of Fig. 2 shows that the box is fitted on its inside with three small stationary plugs, about which are wound springs f^1 f^2 f^3. At the end of the plug f^1 there is a wooden cross piece against which the spring abuts. The ends of f^2 and f^3 are also, by a wooden bar, held in place by the tension of the springs, and a handle is attached to the center of the connecting piece. Both bars are likewise connected by a fine thread s^1 s^2, which is in light contact with the surface of the carbon cylinders *n n*, etc. It will be seen that by pulling out the handle *g* and then releasing it, the connecting threads are tightened or slackened, which motion produces a rotation of the cylinders. Messrs. Mercadier and Anizan state that this simple mechanical device protects the microphone against the injurious effects of the accumulation of dust on the electrodes and oxidation, and is a guarantee for the absolute and high efficiency of their instrument.

Telephonist.

British Electrical Patents Expiring in 1895.

The following list of leading electrical patents expiring in Great Britain during 1895 is given by the London *Electrician:*

Dated 1881.	No.	Name	Subject of Pat.
Jan. 11	129	C. Faure.....	Secondary lead battery, pasted plate.
Feb. 23	768	T. A. Edison.....	Lamp filament joint, by plating.
Feb. 28	783	J. Perry and W. E. Ayrton	Electric traction, buried conductor and block system.
April 26	1,802	T. A. Edison.....	Screw lamp holder and lead fuse.
April 28	1,835	C. F. Brush.....	The Brush regulator.
May 10	2,038	R. J. Gülcher....	The Gülcher arc lamp.
July 7	2,989	J. Hopkinson....	Coupling two or more motors in series or parallel for varying the speed of vehicles.
July 21	3,189	H. S. Maxim. ...	The Maxim glow lamp.
Aug. 18	3,599	C. Lever.....	The Lever arc lamp.
Sept. 10	3,926	J. S. Sellon	Secondary battery plates, roughened and indented
Sept. 29	4,202	J. W. Swan.....	Lamp filament jointing by flashing.
Oct. 11	4,409	T. O. Callender..	Vulcanized bitumen for cables.
Dec. 28	5,702	J. W. Swan.....	Lamp holder for bottom-loop lamps.

American Institute of Electrical Engineers.

The 93d meeting of the Institute was held at 12 West 31st street, Wednesday evening, January 16th, President Houston in the chair. Professor Macfarlane, of Ithaca, N. Y., read his paper "On the Units of Light and Radiation," which was discussed by Messrs. Kennelly, Walcott and Burnett. It was voted subsequently that the paper be referred to the Committee on Units and Standards for consideration.

The paper by Mr. Alton D. Adams, of Boston, was read by the author, and discussed by Messrs. Crocker, Richard Fleming, Sheldon, Ashley, Burke, Waldo, W. L. Bliss and Gano S. Dunn.

At the council meeting in the afternoon 13 associate members were elected and five associates were transferred to full membership.

Silas H. Seymour has been appointed receiver of the Salamanca, N. Y., Electric Light and Fuel Company. The plant was shut down recently by a mortgage foreclosure, but will now be operated again by the receiver.

Municipal Ownership of Electric Light Plants.

It is, indeed, a fact, says the Chicago *Journal*, as Prof. Richard T. Ely told the Union League Club last night, that "unscrupulous wealth, in conjunction with unscrupulous poverty, is responsible for much corruption." But Professor Ely errs when he deduces from this fact the conclusion that the cure is to be found in municipal ownership of street car lines or lighting works. Professor Ely says: "We must either allow private ownership and then control it by public authority, or we must have public ownership and public management." But we have both plans in force now in Chicago, and there is as much corruption in one case as in the other. Nor would it mend matters one iota to make our system all one or all the other, as long as the man who can put up the largest wad gets the ward nomination for alderman, and as long as the heeler who can by hook or by crook secure the most votes for his mayoralty candidate gets the fattest municipal appointment.

The question whether it is to the best interest of municipalities generally to own and operate their gas and waterworks, electric plants, street cars, etc., is one of much interest and which provokes a vast deal of controversy, remarks the Wisconsin *State Journal*. Men of sound judgment differ upon the question. In some cities municipal ownership seems to have promoted economy and been attended by generally satisfactory results. In others just the opposite has been experienced. The Philadelphia *Times* has been a determined advocate of municipal ownership, and yet we find the following in regard to the gas works of that city, in a late issue: "If Philadelphia had given the gas works away for nothing 30 years ago, the municipality would be vastly richer to-day, and an immeasurable amount of political debauchery would have been averted."

The following figures on the relative cost of lighting plants under private ownership and collective ownership are taken from the *American Land and Title Register:*

PRIVATE PLANTS.

	Population.	Cost per Light.
Kalamazoo	24,000	$170 50
Houston	27,500	150 00
Springfield, Ill.	25,000	137 00
Pueblo	24,000	132 00
Waterbury	24,000	121 00
Springfield, Mo.	22,000	114 00
Wichita	24,000	108 00
South Bend	22,000	100 00
Newport, Ky	25,000	100 00
Allentown	25,000	100 00
Joliet	23,000	100 00
Chattanooga	29,000	96 00
Leavenworth	19,000	96 00
Birmingham	26,000	96 00
Montgomery	22,000	90 00
Auburn	26,000	87 50
Roanoke	25,000	67 60
Racine	21,000	80 00

The average cost in these 18 cities is $109.31. The average for the following 20 cities owning their plants is only $55.50.

PUBLIC PLANTS.

	Population.	Cost per Light.
Easton	15,000	$82 40
Ashtabula	8,000	77 00
Little Rock	25,000	70 00
Elgin	20,000	62 00
West Troy	13,000	60 00
Marquette	9,000	60 00
Frederick	8,000	60 00
Aurora	20,000	58 40
Madison	9,000	58 00
Alexandria	14,000	55 00
Lewiston	22,000	55 00
Bloomington	20,400	51 60
Decatur	17,000	50 00
Hannibal	13,000	50 00
Bay City	28,000	49 70
Titusville	8,000	47 00
Jamestown	18,000	44 00
Dunkirk	10,000	41 48
Anderson	11,000	40 00
Portsmouth	12,000	$8 50

OUR BOSTON LETTER.

McKenney & Waterbury, of No. 181 Franklin street, this city, are doing a splendid business in their electrical department, and have recently closed some very large contracts in Boston and vicinity. A large share of the equipment of the new State house with electric fixtures has been awarded them, and their work in this building, especially in the Hall of Representatives, is worthy of special mention, their fixtures there being among the finest yet produced in this country.

The Railroad Commissioners have finally decided not to allow the West End Company to run their tracks through Marlboro street, the residents of that aristocratic section having made a strong protest against it. One of the very few horse car lines still left in Boston runs through this street, and the property owners seem to think that their requirements are sufficiently well met without the introduction of electricity. The action of the commissioners closes the controversy for the present, but they state that when the conditions warrant it, the matter may again be brought to their attention.

Mr. Frank B. Parsons has withdrawn from the active management of the Davidson Ventilating Fan Company of this city, and will hereafter devote his whole attention to the affairs of the Norwich Insulated Wire Company, in which he is largely interested. This company have recently closed some very large contracts for underground work, among them being one from the West End road, which involves an immense amount of labor. This and other important interests require Mr. Parsons' undivided attention, and he will in future represent the Norwich Insulated Wire Company exclusively in this section. Mr. Parsons has opened offices at 35 Congress street, where he will extend a hearty welcome to his many friends.

The Perkins Electric Switch Manufacturing Company, of Hartford, Conn., have removed their Boston headquarters from 620 Atlantic avenue to 182 Summer street, and are now in a position to carry the large stock which the trade in this section demands. The business of the Perkins company, under the able guidance of F. B. Smith, resident manager, has developed greatly in this section during the past year, and the demand for goods in constantly increasing quantities, has necessitated very much larger storage facilities in this city. The new location is all that could be desired in this respect, and will at the same time allow of a full display of their various specialties. The commodious new factory of the Perkins company in Hartford is now in operation, and they are fully equipped to handle the business of what they confidently look forward to as being the biggest year in their history. Mr. J. J. Gates is in active charge in Hartford, and under his progressive management there is little doubt of their expectations being fully realized.

The Lighthouse Board are asking for bids for the erection of three range lights to be located in South Boston, and are considering the advisability of using electricity for this purpose. There should be no hesitation on the part of the board on this question, as there is not the slightest doubt as to which will give the best results. Although as yet nothing of the kind has been used in this section, the magnificent results of the system at Sandy Hook in New York harbor, both in the Sandy Hook Light and the electric buoys in Gedney's channel, besides the lightships and other important points already equipped with electricity by the government, leave no room for doubt as to the best medium for lighting service. If the members of the board want any information regarding the plant in New York harbor, they can get it by referring to the pages of the ELECTRICAL REVIEW of March 12, 1892, where the entire system is minutely described.

H. G. T.

Boston, January 19.

PERSONAL.

Mr. J. J. Wood, of the Fort Wayne Electric Corporation, Fort Wayne, Ind., was among the visitors to New York last week.

Mr. Bernard Gallagher has been elected president of the Citizens' Electric Illuminating Company, of Brooklyn, N. Y., vice H. McLaughlin.

At the annual meeting of the Edison Electric Illuminating Company, of New York, held last week, G. F. Gregory was elected a director in place of E. H. Johnson, and Arthur Curtis James in place of J. Hood Wright. Mr. James is a member of the firm of Phelps, Dodge & Company. Mr. Gregory is connected with the Standard Oil Company.

Mr. Thos. D. Lockwood, of Boston, was a New York visitor last week, conferring with Mr. Chas. L. Buckingham. When these two talented technical representatives of two as highly successful corporations as the American Bell and the Western Union put their intellects together there ought to be something in it. There are a good many patents relating to telephones owned by these two corporations—working together in beautiful harmony at present—and Messrs. Lockwood and Buckingham know the value, or otherwise, of every one of them.

National Electric Light Association.

TO THE EDITOR OF ELECTRICAL REVIEW:

The Trunk Line Association have granted a rate of one and one-third fare for round trip, on the certificate plan, for members and delegates attending the eighteenth convention, to be held in Cleveland, O., February 19, 20 and 21. Negotiations are now pending for a special train from New York to Cleveland, notice of which will be given as soon as route is selected and schedule arranged.

Yours very truly,

C. O. BAKER, JR.,
Master of Transportation.

The Carbonnelle Microphone.

Telephone engineers have for a long time supposed that the microphone invented by Prof. Hughes, and a most important part of any telephone system, has but little value for long distance working without the use of an induction coil, as first proposed by Edison; and the consequence is that practically all modern instruments used for inter-urban or even urban telephone circuits are provided with induction coils, by means of which the transmission voltage is raised to a point capable of carrying a sufficient amount of current over the considerable resistance of the line circuit, says the London *Electrical Engineer*. The adoption of this method is, of course, due to the comparatively low resistance of the carbon microphone, whereby the changes of resistance set up in it, as compared to the whole resistance of line and instruments, are very small, and not enough to affect the receiver; hence the use of an induction coil or transformer at each end, and hence, also, the necessary employment of a battery for each instrument to operate the same.

M. Carbonnelle has devised a type of microphone which is based upon a very high resistance, this being normally 1,000 ohms. When the instrument is used for speaking the resistance rises to six or eight times that value, and thus represents a large proportion of the entire circuit resistance. According to *L'Industrie Electrique*, this plan effects a very great saving in more ways than one. To begin with, all the batteries are maintained at the central exchange, and none are required on the subscribers' premises. A magneto call is alone necessary for each subscriber, and the massing together of cells at the exchange enables their number to be much reduced. Thus three Leclanché cells are found to be amply sufficient for clear speech over short distances, and, as in practice one set of cells is enough to work five subscribers' lines, there are only 1,800 cells necessary for an exchange of 3,000 subscribers. Usually six cells are employed in the French telephonic systems for each subscriber, or 18,000 cells for a similar exchange—10 times as many, and involving much more trouble and attention, because they are scattered all over the network instead of being concentrated at the exchange. For inter-urban speech five cells are quite sufficient to insure clearness. For instance, the telephone system at Brussels uses an earth return. It has multiple switchboards of 200 subscribers each, but only one cell is employed per subscriber. With the high resistance microphone, instead of induction coil instruments, three cells each are enough for 32 communicating cords used in urban work, and five each for eight other cords kept for inter-urban service. This gives a total of 136 cells, or a saving of one-third over those required on the old plan.

A large number of advantages is claimed for the new method on the score of less waste in the cells employed, greater convenience and reliability of service, better results over long distances, and so forth. There is certainly some novelty in the device, since it completely upsets ordinary ideas about successful telephone working conditions. At the same time, there seems no objection to its use or introduction into systems otherwise equipped.

The Thomson-Houston Regulator Patent Declared Invalid.

Judge Grosscup, in the United States Circuit Court at Chicago, on January 14, rendered a decision in the case of the Thomson-Houston Electric Company vs. the Western Electric Company for infringement of its patent for an automatic regulator for dynamo electric machines.

In Judge Grosscup's decision it is held that the patent in suit, No. 238,315, is invalid on the ground that it possesses no novelty, in view of an earlier patent, No. 223,659, on the same invention, which, in the language of the court, "discloses a device almost identical with that of the patent in suit."

"The object here as in the subsequent patent of Thomson-Houston," Judge Grosscup says, "was to obtain a device that would move the brushes backward and forward responsively to the electrical condition that such movements were intended to meet. The problem sought to be solved by the patent in suit was a somewhat different one in its ultimate ends, but the object of both patents was reached by the application of any principle and the use of any device that would automatically maintain constancy of current, notwithstanding changes of motive power or resistance." The court concludes that: "It was adjustment purely, and not a new conception of either a principle of electricity, or a mechanism to carry it out," which formed the basis upon which patent No. 238,315 was obtained.

The proceedings in the case were begun in 1890, and there are three volumes covering the testimony taken.

A New "Pole" Line in Ohio.

TO THE EDITOR OF ELECTRICAL REVIEW:

Enclosed please find a slip which may interest you. I am not sure whether the new incorporation is a telephone company, but it has been suggested to me that it is a Pole line.

Yours truly,

E. P. ROBERTS,

Cleveland, O., Jan. 12, 1895.

COLUMBUS, O., January 10.—The following articles of incorporation were filed in the office of the Secretary of State: A Clevelandi Mayar Iparosok Grof Batthyany Lajos Tarsas es Segelyzo Egylet, Cleveland.

The Edison Electric Illuminating Company of New York makes the following comparative statement of earnings for December:

	1894.	1893.	Increase.
Gross.....	$165,994.33	$143,191.50	$22,802.83
Net.....	81,358.64	74,968.43	6,390.21
Twelve months:			
Gross.....	$1,464,336.44	1,245,524.87	218,811.57
Net.....	789,466.58	605,642.72	183,823.86

Dr. Louis Duncan, of Johns Hopkins University, Baltimore, was a New York visitor last week.

ELECTRICAL REVIEW

Published at 13 Park Row,
P. O. Box 2339. NEW YORK.

EDITOR:
CHARLES W. PRICE.

ASSOCIATE EDITOR:
STEPHEN L. COLES.

REGISTERED CABLE ADDRESS:
"ELECTVIEW," NEW YORK.
1546 "CORTLANDT," TELEPHONE CALL.

BOSTON OFFICE:
H. G. TUCKERMAN, Room 29, 620 Atlantic Ave.
WASHINGTON OFFICE:
GEO. C. MAYNARD, 800 H St., N. W.

SUBSCRIPTION TO THE
ELECTRICAL REVIEW.

One Year, United States and Canada, - $3.00
One Year, Foreign Countries, - - 5.00
Single Copy, - - - - - - - - .10
Back Copies, each, - - - - - - .25

NEW YORK, JAN. 23, 1895.

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A discussion is going on in England with reference to the word "scientist." Among other prominent men who unreservedly condemn the word is Lord Kelvin, who prefers the word "naturalist." It would seem that common usage had given "scientist" a proper place in the language and we fancy that this will prove to be the case.

THE FIRST ELECTRICAL WEEKLY IN THE UNITED STATES.

Our esteemed contemporary, the *Western Electrician*, in its issue of January 15, 1895, said:

The *Electrical World* is not the "pioneer in its line," as its claims. The ELECTRICAL REVIEW was the first general weekly electrical paper published in the United States, and is entitled to whatever distinction there is arising from that fact. The *Electrical World* is an offshoot of the old *Operator*, an obscure telegraphic publication, with which the present proprietor of the *World*, an ex-telegraph operator—not an electrical engineer or a journalist—became connected while yet employed by the Western Union company.

We are glad to confirm the statement of our contemporary. Here are the facts: The last number of the *Operator and Electrical World* appeared on April 21, 1883. A week later, that is, on April 28, 1883, the first number of *The Electrical World* appeared as a weekly. From this time until its final demise *The Operator* appeared as a separate sheet.

The first number of the ELECTRICAL REVIEW (which had been previously published for over a year as THE REVIEW OF THE TELEPHONE AND TELEGRAPH), a weekly journal devoted to all electrical interests, appeared on March 22, 1883, thus antedating *The Electrical World* by over five weeks.

This is a small margin, but sufficient to establish the facts, which are all matters of record and can be verified.

Therefore, remember that, in spite of tons of chromatic circulars from W. J. Johnston's office, the first general electrical weekly published in the United States and in existence to-day was the ELECTRICAL REVIEW.

It seems that during the recent uprising in Hawaii a Mr. Ballantyne distinguished himself and received an unusual reward. The story is told briefly in the press dispatches as follows:

A cannon was planted in the road and pointed at the fort. Gunner Johnson was assisted by Mr. Ballantyne, a veteran of the Canadian volunteer artillery. He gave a splendid account of himself yesterday, and the republic's forces out there voted him an exclusive eternal franchise for an electric railway in Honolulu. Mr. Ballantyne is down here as a representative of a transit syndicate.

So a few shots dropped valuable fruit into Mr. Ballantyne's lap. Such a wide-awake gentleman cannot but make a success of his electric railway scheme, to which we wish prosperity and large dividends. An "eternal" franchise is indeed a prize.

Do not be afraid to venture a little for business during 1895. Stocks are quite generally depleted. You can profit by helping to replenish them.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

Business does not show any marked improvement. There are signs, however, that prices have reached bottom, and in some instances have turned. The moment the reaction sets in, that moment will the era of better times be inaugurated. Business is moderately active—more so than is popularly supposed—but it is being conducted without a profit. With an increase in net revenues will come a complete change. Wall street, so often a barometer of business conditions, has been largely left to itself of late. Just now sentiment has dictated that a reaction is overdue and must occur. The bears who have signally failed to make money, owing to the narrowness of the market, are content to step aside and allow the bull clique to put up prices. This is precisely what is now taking place. News is bad, worse than it was during the short January decline, but it has no effect. Operators prefer to ignore it, and choose to be guided by such phantoms as a railroad pooling bill and possible currency reform at this session of Congress. The enactment of two such measures would undoubtedly stimulate values. Likewise the absence of action must be felt, but not necessarily within the next few days.

In electrical stocks during the week there was very little of especial interest. The most prominent feature of that class of securities just now is the demand for street railway stocks which arises through a desire for safe investment. The fact that capital is turning to that class of securities speaks well for their past record as well as their future.

General Electric securities were passive, ranging between 34 and 35. The low point was recorded on Saturday, it being 33¾. The company has recently purchased $100,000 of its 5 per cent debenture bonds, and now has on hand approximately $1,200,000. After the payment of December interest on its bonded debt it had on hand about $400,000 in cash, against which it had notes payable of $2,827 and was liable for indorsements to the amount of $35,000.

The annual meeting of the Edison Electric Illuminating Company of New York was held on Tuesday. This company is regarded as an index to the electric lighting industry, and the gratifying showing made by its annual report speaks well for kindred enterprises. The annual statement for the year ending December 31, which shows a surplus of $106,003 against $9,648 for 1893, and that, too, after paying 6 per cent on the stock, against 5 per cent in 1893, follows:

	1894.	1893.	1892.
Gross	$1,369,066	$1,193,338	$942,575
Operating expenses	550,426	527,311	385,494
Net earnings	818,639	666,027	557,081
Other income	32,944	28,221	20,446
Total	$851,583	$694,248	$577,527
Legal expenses and taxes	134,443	112,570	102,384
Balance	$727,140	$581,678	$475,187
From investments	62,325	23,964	
Total	$789,465	$605,642	
Interest	207,266	144,820	
Balance	$582,199	$460,822	
Dividends	476,196	451,174	
Surplus	$106,003	$9,648	

The gross earnings increased 17½ per cent in 1894 over 1893. Net increased 30 per cent. The ratio of net to gross was 64 per cent, against 48 per cent the previous year, showing a large increase in the economy of operations. The date of the annual meeting was changed to the last Tuesday in February.

The increase in the company's business is shown by the following table:

	1894.	1893.	1892.
Number of customers..	5,837	5,154	4,344
" lamps	234,494	192,691	142,492
" motors	7,616	5,529	3,807
" arc lamps ..	3,014	2,538	1,637

The stock recorded quotations of 99¾ to 101¼. The bonds were sold at 108 to 108½.

On the Boston Exchange the weakness in Bell Telephone continued. The price dropped to 186½ to 187, and reacted to 190. Erie Telephone was steady between 53 and 54. General Electric was unchanged at 67. New England Telephone showed some strength at 68 to 69. Westinghouse securities weakened somewhat. The preferred dropped to 49¾ to 50, the common to 32½ to 33.

Two Western telephone companies which made reports during the week on 1894 operations, show that there has been a sharp improvement in business in the West. The Central Union Telephone Company, which controls the territory of Illinois, except Chicago, all of Ohio, except Cincinnati, Cleveland, and a tier of counties along the Ohio River, all of Indiana, except Vincennes, and the major part of Iowa, shows net earnings of $405,988 and a surplus of $75,723 after paying $330,265 in dividends on $6,605,300 capital stock.

The Chicago Telephone Company after payments of dividends of $455,544 on $3,796,200 capital stock showed a surplus of $53,032. BAIN.

New York, January 19, 1895.

Northwestern Electrical Association.

The third annual convention of the Northwestern Electrical Association was held at the Hotel Pfister, Milwaukee, Wis., on January 16 and 17. The following is the programme of the meeting:

Wednesday morning — Organization, report of committees, president's address.

Wednesday afternoon — "Hints Upon Daily Work About a Dynamo Plant," Mr. Pliny Norcross; "Interior Conduit and Interior Wiring," Mr. Charles Burton.

Wednesday evening—"Incandescent Lamps vs. Welsbach Burner," Mr. William Goltz; "Some Characteristics and Economies of Accumulators as Applied to Central Lighting and Power Stations," Mr. John R. Markle.

Thursday morning—"Incandescent Lighting on the Meter System Compared with Contract System," Mr. G. L. Cole; "Auxiliary Adjuncts to Electricity," Mr. T. R. Mercien.

Thursday afternoon—"Competition," Mr. John Schuette; "Electrical Business," Mr. Chas. E. Gregory; "College and Station," Prof. D. C. Jackson; "Common Councils," Mr. P. H. Korst; "Water Power," Mr. Geo. A. Davis; "Profits," Mr. Geo. Grimm.

Thursday evening—Banquet.

Friday—Entertainment Committee the master.

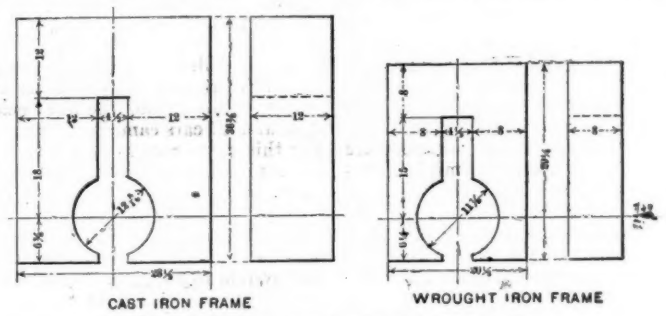
THE BEST METAL FOR FIELD MAGNET FRAMES.

A PAPER READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, NEW YORK AND CHICAGO, JANUARY 16, 1895, BY ALTON D. ADAMS.

Cast-iron, cast-steel and wrought-iron being the materials at our command for field magnet construction, it is an important question to the engineer and manufacturer which will produce a dynamo of given capacity, speed, efficiency and working qualities at the least cost.

I am not aware that any of the works on dynamo construction attempt a definite answer to this question, and the practice of builders is by no means uniform. Economical points of saturation requiring about the same magnetizing force per unit of length in each metal, are for cast-iron a little under 40,000, cast-steel, 70,000 to 80,000, and wrought-iron about 90,000 lines per square inch.

The cost of cast-steel is fully equal to that of forgings in simple shapes, and as it lies between cast and wrought-iron in magnetic qualities, the cost of machines made with it will be between those of cast and wrought-iron. A comparison will, therefore, be made between the cost of the latter two.



THE BEST METAL FOR FIELD MAGNET FRAMES.

To be fairly compared, machines of different materials must be equal as to magnetic flux in field and armature cores, ampere-turns on armatures, field ampere-turns required in air-gaps and as nearly as possible in magnet frames, watts used in windings, and be of the same capacities and speeds.

Taking wrought-iron at a saturation of 90,000 and cast at 40,000 lines per square inch, the section of an equivalent cast will be two and one-quarter times that of a wrought frame, and as the length of the cast-iron frame must be a little greater to give enough winding length, its weight will be about two and one-half times the wrought. A saving is thus at once made in favor of the wrought magnet, as forgings can be had per pound for much less than two and one-half times the cost of cast-iron.

The same number of ampere-turns and watts being required for the coils of the cast as the wrought-iron magnet, and the weight of wire varying as the square of its length, the coils for the cast-iron frame will be much heavier. The armature core may have the same diameter in each frame, but must be longer in the cast frame so as to come under the pole-pieces, thus materially increasing its weight.

As for the same resistance, the weight of armature winding increases as the square of its length, considerable more wire is required for the armature core of the cast-iron machine. In addition, the purely mechanical parts, shaft and base, must be larger and more costly in the cast-iron machine because of the greater weights they have to carry.

To illustrate the difference in cost of construction the following data of two machines is presented, each having capacity of 25 kilowatts of 1,275 revolutions per minute, the same winding losses, the same ampere-turns on armatures and field ampere-turns in air-gaps, equal to about twice the armature ampere-turns active at the pole corners.

The air-gaps and armature cores of each machine are crossed by 4,320,000 magnetic lines, and allowing a leakage of 25 per cent the field core must furnish 5,760,000 lines.

A wrought-iron field to carry 5,760,000 lines, at 90,000 per inch saturation, requires a section of 64 square inches, which is provided by a core of eight inches square, and a cast-iron field at 40,000 lines per square inch requires a section of 144 square inches provided by a core 12 inches square.

Allowing sufficient length for magnet windings, the same air-gap resistance and an armature core of 11 inches diameter for each of these frames, their dimensions will correspond to the following drawings. The weights of these frames are: Wrought-iron frame, 1,020 pounds; cast-iron frame, 2,730 pounds.

For work as shunt motors, the wrought-iron machine requires 11,000 ampere-turns in the air-gaps and 2,000 in iron, the cast machine, 11,000 ampere-turns in air-gaps and 3,800 in iron.

With 440 watts expended in field coils of each machine, an average length per turn of 38 inches in the coils for wrought-iron and 54 inches in the coils for cast-iron, the weights of these coils are: Wrought-iron machine, 133 pounds copper; cast-iron machine, 340 pounds copper.

The drum armature for the wrought frame is 11 inches diameter and 8 inches long; that for the cast frame 11 inches diameter and 12 inches long, without allowance for shaft hole.

The weights for armatures are: Wrought-iron machine, 211 pounds disks; cast-iron machine, 316 pounds disks.

With a loss at full load of 490 watts in the armature winding for wrought-iron machine, and 464 watts in the armature winding for cast-iron machine, these windings require in wrought-iron machine, 49 pounds copper; cast-iron machine, 71 pounds copper.

The above indicates plainly the great saving of wrought over cast-iron in dynamo construction.

From the users' standpoint the wrought-iron machine seems preferable on account of its lesser weight and bulk, this difference being especially marked in machines for direct connection to engines and other purposes where slow speed is necessary.

Our recent criticisms at the expense of a contemporary have produced nothing from its direction but a chilly silence. Another batch of circulars, however, is due at any minute.

A Criticism That Bites and a Record That is Exact.

[*From the Western Electrician.*]

The *Electrical World* is not the "pioneer in its line," as it claims. The ELECTRICAL REVIEW was the first general weekly electrical paper published in the United States, and is entitled to whatever distinction there is arising from that fact. The *Electrical World* is an offshot of the old *Operator*, an obscure telegraphic publication with which the present proprietor of the *World*, an ex-telegraph operator—not an electrical engineer or a journalist—became connected while yet employed by the Western Union company. Losing his situation as a telegraph operator, Mr. Johnston gave his entire attention to newspaper publishing enterprises, but with indifferent success, as of the four papers which he has controlled three have been wrecked by the coolness of an unfeeling public and are now but memories. The *Operator* was simply a telegraphic paper for many years, and, if memory serves, it remarked when the REVIEW was established that a general electrical journal was surely doomed to failure. We believe that the *Electrical World* has had a separate existence of about ten years.

But Mr. Johnston's brilliant plans for a journalistic trust, by securing all the advertising in one branch of trade exclusively for one of his papers, have been put forward by him before. For instance:

He established *Industrial America*, which was to supplant journals of the class of the *Iron Age* and gather unto itself all the advertising in the metal-working line. The scheme failed utterly.

He started *Johnston's Journal*, which was to be a high-class literary periodical that should outdo *Harper's*, *Scribner's Monthly* and similar magazines, and get all the advertising of this class. This, too, was an ignominious failure.

He managed the *Operator*, too, with the idea of gathering all the advertising in one net. Now the *Operator* is but a name in the Johnston private burying-ground of journalistic wrecks.

The same old dodge is now being worked by Mr. Johnston for the *Electrical World*. It will fail now as it has in the past. Business men are disgusted at the malice and obtrusive selfishness of the scheme. If precedent is any guide, Mr. Johnston has overshot the mark and is inviting ruin for his present enterprise.

The following electric light companies have elected officers for 1895: Dolgeville, N. Y., Electric Light and Power Company — President, E. R. Nankel; secretary, N. A. Snell; treasurer, W. S. Armstrong. Sandy Hill, N. Y., Electric Light Company—Directors, John J. Cunningham, John H. Derby, W. B. Baldwin, C. T. Beach, J. E. Howland, Granville M. Inglesbe, S. H. Kenyon; president, J. E. Howland; vice-president, S. H. Kenyon; treasurer, C. T. Beach; secretary, Granville M. Inglesbe.

THE SERIES SYSTEM OF ELECTRIC TRACTION FOR AGRICULTURAL LIGHT RAILWAYS.

BY NELSON W. PERRY, IN LONDON "ELECTRICIAN."

I have been much interested in the letter of Sir Courtnay Boyle and the discussion to which it has given rise on the question of light railways, as reported in your valued paper of November 9. I gather from this that it is probable that a relaxation of the Board of Trade restrictions, such as now seem to render such undertakings entirely impossible, may be granted in the event of a proper presentation of the case by the Associated Chambers of Commerce, etc., before whom Sir Courtnay Boyle's letter has come. There seems, then, a question whether or not if these roads could be constructed into the agricultural districts their traffic would warrant the outlay, and several of the speakers insisted that government aid would be required for their establishment.

While in this country we have had no experience with electric railroads of two and one-half feet or three feet gauge, such as seems to be in mind in England, our experience with the four feet, eight and one-half inch gauge (or thereabouts) has amply demonstrated their dividend-earning capacity, provided they have not been handicapped by a too large fixed investment for the traffic of the territory through which they operate. Much territory adjacent to our larger cities, which but a few years ago was purely agricultural land, has already been subdivided into building lots, and much of it occupied, so that the roads that have developed this property are now doing a profitable traffic in what was agricultural land. The distances, however, to which these roads can reach, without a too great investment of copper (remembering that the weight of copper must increase as the square of the distance) has been, comparatively speaking, so limited that we have no electric roads that could be, strictly speaking, classed as agricultural roads, or which depend in any considerable degree upon farm patronage for their incomes.

In the first place, all of our roads to the outlying districts are but extensions of city systems usually supplied with power favorably located for city distribution. As the extensions must necessarily be of the same gauge as their urban portions, the cost of construction in the outlying districts can be but a fraction less per mile than that lying within the city limits. The location of the power station favorable to the city traffic places it in the most unfavorable position as regards the outlying lines, limiting the distance to which such roads can be economically operated to, I should say, seven miles as a fair figure, beyond which it becomes more economical to erect a second power station, and put on the payroll a duplicate set of employés, with all that that implies, than to put sufficient copper into the circuits to reduce the drop in line at greater distances to a permissible figure.

It seems exceedingly doubtful if a purely agricultural country, however thickly settled it may be, could support a railroad involving the fixed outlay required by a standard track or that involved in sufficient copper to carry the current without disastrous drop to the distances required on the one hand, or the investment in a duplicate station on the other. The investment in permanent way must be decreased, and the suggestion of reducing the gauge to two and one-half or three feet and using a lighter rail appeals to me as being certainly in the right direction. But it seems to me that another step is also imperative, viz., that the cost of distributing current must be also reduced in order that such roads should be self-sustaining. In cities where areas rather than distances are concerned, the multiple arc system has been all but universally employed for electric railways and incandescent lighting, the facilities which such requirements afford for tying together such a system by feeders of comparatively short length having rendered it economical. When, however, we come to the arc light which is distributed over still larger and more sparsely settled areas the constant current or series system has had to be resorted to. In fact, it would seem that the constant current method, if certain of its objectionable features could be removed, would be the ideal one for great distances, and especially so where not only distances but constantly varying and shifting loads are concerned, as in electric traction.

By the multiple arc system, if we go twice the distance we must invest four times as much in copper; if three times the distance, nine times as much. The question arises, Will the traffic at double or treble the distance pay four or nine times as much as the shorter haul, as it would be required to do to pay its share on the outlay? This question will in every case be answered in the negative. As a matter of fact, the traffic from the more distant portions will pay a less and less proportion of average cost per mile as those distances are greater and greater. A limit is therefore soon reached beyond which every additional mile becomes an increasingly great burden upon the road until it bankrupts it.

When we come to consider the distribution of current to electric railways by the constant potential method, we see how irrational and uneconomical it is. Our conductors are necessarily fixed in size. The pressure is also fixed, and the current, which is the thing that must be delivered, is variable. The conductor must, therefore, be proportioned so as to deliver the maximum current at the further end with an allowable drop. Such an investment of copper is never warranted by the business at the further end. It could only be warranted by a steady demand for that maximum current at the further end.

In practice this maximum load may not occur at that point but once or twice a day, and then only last a few minutes at a time. More often on a light road there would be no load at the further point, and the mean load would be but an insignificant fraction of the maximum, yet the copper must be put in in order to operate that load when it occurs, even though it be for a few minutes only. A much more rational method would be to make our current the constant factor of the energy, and the pressure the variable. By so doing the investment in copper would vary directly as the distance, instead of as the square of the distance, or about in the same ratio as the traffic might reasonably be expected to vary.

Another feature is that having once determined the size of conductor that will be most economical for one car a mile distant, that same size will remain the most economical for 20 miles, whether there be one car or a dozen, and whether those cars all be bunched at the further end, or be distributed along the route. Compare this with the constant potential method, where our conductors become least efficient when, for economy's sake, they are required to be most so—viz., when the load is at the further end.

It is exceedingly doubtful if any road, even a light road, depending upon the traffic furnished by a sparsely settled country, could be successfully operated to any considerable distance, where the copper required must be increased as the square of that distance, or the loss in transmission on the line must increase as the square of the energy supplied.

This brings us back again to the constant current method, in which both the copper and line loss increase only as the distance or as the load, or, in other words, in proportion to the traffic.

But the constant current method of distribution for moving translating devices, as tried both in this country and in England, has developed so many difficulties that it has had to be abandoned. Speaking of the difficulties as developed here, with which I am familiar, they were the following: The switches by which the current was diverted from one wire to another, so as to enable the cars to run in series, were mechanical, were necessarily placed on the trolley wires themselves, where they were exposed to the weather. They were required to fit tightly to prevent burning out, and frequently became so tight as not to operate. They were moved by the trolley as it passed by—one car throwing the switch in one direction and the succeeding car throwing it back again to its original position; hence, if one car failed to operate the switch properly, the next car would leave no switch to throw, and the line became open and all cars came to a standstill. For this same reason cars had to be put into and taken out of service in pairs, or the circuit would become open, and branching roads or interconnecting systems could not be operated; for a car, in passing from one system to another, became a case of adding a single car to one system and taking one car off of another, which would leave both open. And, again, the result was the same if the trolley got off the wire; everything had to stop until it was replaced and the dynamo had time to build itself up again.

Experience demonstrated, however, the extreme economy of operating cars in this way over the multiple arc method. One of the greatest advantages was the ability of recovering the energy consumed in bringing the car up to speed, or in ascending a grade by electrically braking the car on bringing it to rest or in checking its speed on a descending grade. This is accomplished by simply revolving the brushes around the commutator, whereby the motor is converted into a dynamo in series with the one at the power house, and driven by the momentum of the car or by gravity. The advantage of utilizing this energy instead of frittering it away in heat on the brake shoe, as is done in mechanical braking, is certainly very great, and was very fully demonstrated by Professor Short in a series road some three miles in length at St. Louis. It was also demonstrated, if I mistake not, in England, at Northfleet, and described by Mr. Edward Manville before the British Association in September, 1888.

But the irregularities introduced into the circuit by the cars were cumulative, and became so great that when more than three or four cars were put into service the system had to be abandoned as impracticable. It was but a repetition of Mr. Brush's experience with the arc lamp. He solved the difficulty with the lamps, however, by the introduction of the automatic cut-out or by-path so satisfactorily that any number of lamps may now be operated successfully in series, and arc light circuits operating 100 to 150 lamps each are already common in this country, and the tendency is rather to increase than to diminish the number.

The constant-current road failed for the same reason that the constant-current distribution to arc lamps failed at the same stage of its development.

I have ventured to suggest the introduction of the automatic cut-out into electric railway circuits operated on the constant current system, and believe that with this and other improvements at the same time this method of distribution of current to railways has been rendered in every way as practical as has the distribution to arc lamps by the same method.

The Franklin Institute has examined into my invention and deemed it of sufficient merit to honor me with the award of the John Scott Legacy and Medal for 1894, and it occurs to me that it may not be uninteresting to your many readers at this time to refer to some of its supposed advantages, which I do the more willingly since the system is not patented in England, and I do not thereby lay myself open to the accusation of attempting to further my financial interests.

The points which would seem to recommend this series system for adoption on the light roads that you are now discussing may be briefly summed up as follows:

1. Best investment per unit of output in power station.

2. Ability to reach greater distances with a given outlay.

3. The investment in copper will be strictly proportional to the distance and the expected traffic, instead of increasing as the square of the same.

4. The loss of energy in transmission will always be that dictated by the most economical investment in copper, whether at light load or full load, instead of as the square of the load under the most favorable conditions, and a still greater ratio under normal conditions of multiple arc arrangement.

5. The recovery of a large portion of the energy absorbed in acceleration or working against gravity by electrical braking, impossible of accomplishment by present methods.

6. The advantages of a perfectly automatic and positive block system.

It seems to me that these advantages, if they can be attained, as I think they can be now, are such as to practically solve the question which may result from your present discussion of how to construct a light agricultural railway so as to be self-supporting.

Young Men's Institute.

The tenth anniversary of the Young Men's Institute of the Y. M. C. A. of New York city was held in the Institute Hall, 222 Bowery, Tuesday evening, January 15. Wm. M. Kingsley, Esq., chairman of the committee of management, presided. Cleveland H. Dodge, Esq, president New York city Y. M. C. A., and Wm. Dulles, Jr., Esq., treasurer of the Presbyterian Board of Foreign Missions, made short remarks. The old Institute Quartette and the Albian Musical Circle furnished the music. The address of the evening was delivered by Edward M. Shepard, Esq. The annual report made by the secretary, Dr. D. E. Yarnell, showed that the Institute work had made considerable progress during the past year, the membership, enrollment in classes, etc., being larger than ever before.

ELECTRIC LIGHT FLASHES.

The Del Norte, Colo., Electric Light Company has surrendered its franchise.

The Post Office Department will experiment with electric lights in railway mail cars.

The shutting off of electric light, leaving the city in darkness, is inviting robberies and depredations at Findlay, Ohio.

The Common Council of Cedarburg, Wis., has refused to grant J. W. Raeder a franchise for an electric light plant in that city.

The Great Falls, Mont., Electric Light and Power Company has declared a half yearly dividend of $1 per share (4%), payable January 15.

At a special election to be held at Richmond, Mo., on January 28, a vote will be taken on the question of granting the Richmond company a 20-year franchise.

It is expected that the municipal electric lighting plant at Detroit, Mich., will begin supplying current to the downtown district of the city about April 1, 1895.

The plant of the Capital City Railway and Lighting Company, of Baton Rouge, La., has been sold by the sheriff, under execution, and was purchased by the Bank of Baton Rouge for $39,000.

Senator Reynolds has introduced a bill at Albany legalizing contracts for electric lighting in Brooklyn, N. Y., for the space of five years on consent of the Mayor. Contracts are now made from year to year.

The New Haven Electric Company petitioned the Connecticut general assembly for the privilege of using and selling electricity in the towns of Orange, Hamden and East Haven and to increase its capital stock.

The electric light plant at Orangeburg, S. C., has been sold by the sheriff, under execution, to Mr. F. A. Adden for $9,505. The plant is said to be valuable property, but owing to the hard times has not been a very profitable investment.

It is reported that at the next meeting of the Menasha, Wis., Common Council the city clerk will be instructed to advertise for bids for lighting the city by electricity. The present contract for gasoline lights expires July 1.

The new electric light station for the North Attleboro Steam and Electric Company, at Attleboro, Mass., has been completed by the Berlin Iron Bridge Company, of East Berlin, Conn. The building is 62 feet wide and 100 feet long, entirely fireproof, covered with the Bridge company's patent anti-condensation corrugated iron.

In the United States Circuit Court of Appeals at Philadelphia, on January 11, Judge Dallas filed an opinion sustaining the Edison Electric Light Company's injunction against the Messrs. Crump, forbidding them to use in the Colonnade Hotel lamps manufactured by the Columbia Incandescent Lamp Company, of St. Louis, Mo.

A public hearing was had in the Common Council chamber at Albany, N. Y., recently to see whether or not the city shall own its electric light plant and award the contract to the lowest bidder, or renew the present contract at $144 a lamp a year. There was a large gathering. A number of representatives of organized labor were present and they defended the project of the city owning its own plant. Francis B. Delehanty opposed Alderman Stevens' plan for the city to own its plant, saying he believed such a plan would mean the creation of another department to be run by politicians.

It is understood that an effort is to be made by the Cataract General Electric Company, which controls the franchise to lay transmission lines along the Erie Canal for the introduction of electric power from Niagara Falls, to secure the repeal of the law which authorizes the superintendent of public works to make such grants. This, it is claimed, would give the Cataract General Electric Company an absolute monopoly. They secured the repeal of the law last year, but Governor Flower vetoed it. It is understood that they are trying to induce some one to further the repeal legislation.

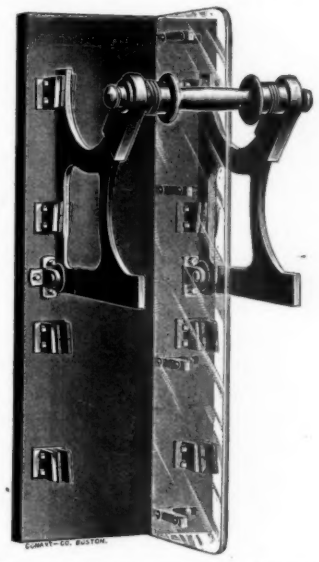
The Citizens' Electric Light Company have two Buckeye engines in their power house at New Castle, Pa., which have a remarkable record for a small amount of repairs. These two engines were placed in position nine years ago and have averaged 18 hours per day of running since that time. They have given no expense whatever, except for packing rings for the cylinders. They are each rated at 60 horse-power, the size of the cylinders being 9x14 inches. The drive wheels are 60 inches in diameter and they are making 260 revolutions per minute. Mr. B. F. Black has run these engines for five years and is naturally proud of their records.

The consummation of the deal between the Citizens' Electric Light Company and the Edison Electric Light Company, of Lancaster, Pa., by which the two rival companies were to be merged into one corporation and operated under the management of the Edison company, has been made. The Edison company, whose capital stock is about $135,000 and bonded indebtedness about $250,000, paid to the Citizens' company a bonus of 25 per cent on each of the 10,000 shares of a par value of $10 each, the cost of the plant, $50,000, and some minor expenses, raising the total to $182,708. Manager P. B. Shaw announced that the following new rates would be charged: The incandescent electric light, 12½ cents per 1,000 watts, less 20 per cent. The rates now charged are 25 cents, less 50 per cent. Arc lights for commercial purpose, burning until midnight, $7.50 per month; burning all night, $10, both less 20 per cent. Motive power, five cents per 1,000 watts.

A New High Potential Switch.

The illustration herewith shows a new type of high potential knife switch designed by Charles H. Herrick, E. E., 133 Oliver street, Boston, Mass., and manufactured by the well-known firm of W. S. Hill Electric Company, 133 Oliver street, Boston, Mass. The engraving represents one of a group of six switches now in use at the Narragansett Electric Lighting Company, of Providence, R. I., where they are successfully carrying currents of 400 amperes at 1,000 volts alternating current.

With the advent of large direct connected generators a need for a switch to handle and transfer the heavy currents was felt, and Mr. Herrick has successfully met the demand. It will be seen that the switch is very quick break, has a flash guard between its opposite poles, breaks both machines and circuit and has its yoke at a point of absolute safety both to



HERRICK'S HIGH POTENTIAL SWITCH.

operator and switch. In operation there is no flash when switch is thrown and the slightest possible "wink" in the lamp to which it supplies current.

The illustration shows a switch adapted for use on the front of switchboards, but designs have been completed for the same type of switch to be placed on the rear of the board. This type is operated by a lever and handle extending through a slot cut in the switchboard. The switch has solid cast copper blades, micanite insulations on yoke and the well-known Hill reinforced contacts, and will be given a carrying capacity of 50 per cent in excess of its regular duty to allow for all reasonable overloads. It is adapted for all varieties of duty from 110 and 500 volt circuits to those carrying 2,000 volts and over alternating current.

It is the intention of the Hill company to build these switches in all sizes and types as demand may arise for them, and they will design this switch to perform any special duty and guarantee results. The Hill company has given it the name of "Herrick high potential switch."

As stated above, the illustration shows the switch in use on the alternating switchboard designed by Mr. Herrick for the Narragansett Electric Lighting Company, which is capable of handling 50,000 to 100,000 sixteen candle-power lamps. The design of this board is such that all changes of machines and circuits are made instantly and without the use of plugs or cables of any sort. The generators can be arranged to run in multiple or independently as desired, provision being made in the design of the board to admit of this feature. This board was also the product of the Hill company's shops and is strikingly handsome, being 22 feet by six feet in size, and the material Italian marble. The Hill company will be glad to answer all inquiries, make quotations, etc., to all who may be interested.

Engineering Society of Western New York.

There has recently been organized at Buffalo the engineering Society of Western New York, which will include in its charter membership members of the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the American Institute of Architects, etc. The objects of the organization are of the broadest nature, and it is not intended to exclude any duly qualified person who may wish to join it. Nevertheless, the professional qualifications of every one admitted will have to be proven in some practical way, and as the society grows and becomes strong, it is intended that membership in it shall be an evidence of competence and a benefit and protection to those employing the members. The officers are: President, George E. Mann; vice-president, E. B. Guthrie; junior vice-president, Walter McColloh; secretary and treasurer, George B. Sikes; directors, George B. Burbank, C. M. Morse. The officers and directors constitute an executive committee. Those named are all civil engineers, with the exception of C. M. Morse, of the Buffalo Engineering Company, who is a mechanical engineer. The society will meet the first Monday in each month.

National Electric Light Association.

The following is the local committee of arrangements for the electric light convention to be held at Cleveland, February 19, 20 and 21:

Chas. W. Wason, chairman; Col. Myron T. Herrick, H. W. Lawrence, Horace E. Andrews, E. P. Roberts, Frank DeH. Robison, Chas. F. Brush, Robt. Lindsay, W. B. Cleveland, S. H. Short, C. Corlett, J. P. McKinstry, S. C. D. Johns, G. W. Cleveland, W. C. Hayes, J. B. Hanna, S. M. Hamill, C. H. Rockwell, J. Potter, Frank Billings, N. S. Possons, E. L. Babcock, Elmer P. Sperry, Samuel Scovil, Geo. M. Hoag.

Mrs. Sidney Short is chairman of the ladies' committee on entertainment. They have arranged to give their guests a luncheon at the Union Club on one of the three days. Their other entertainment will be guided largely by the weather.

TELEPHONE NEWS AND COMMENT.

Camden, N. J., is complaining loudly of its telephone service.

Petersburg, Va., is looking for a new telephone exchange. They want to pay less for such service.

At the end of 1894, out of 10,350 circuits the Metropolitan Telephone and Telegraph Company had but 811 grounded circuits.

The Badger Telephone Company has been granted a franchise at Berlin, Wis. With that name they should earnestly strive to give good service.

The American Electric Telephone Company, with a capital of $15,000 will establish an exchange at Johnstown, Pa., of flood fame. The rate is to be $30 per year.

The Plymouth, Ind., Telephone Company is arranging to connect all the towns in the county with the Plymouth exchange. This is the right sort of enterprise.

Newark, Ohio, is to have a new telephone exchange. The directors of the Newark Telephone Company are arranging with a Chicago company for the installation of the plant.

Telephone and electric light wires are to be interred in the city of Hartford, Conn. The learned editors of that city are now telling the companies how to perform the rites.

Utica doesn't want to be outdone by Syracuse, where it is proposed to bury the telephone wires, and is calling on Supt. C. A. Nicholson to do a little conduiting in that pent-up town.

In Indianapolis a complete overhauling of the wires of the telephone exchange is proposed by the city officials. The Central Union officials are said to be not particularly enthusiastic.

"Measured service" is what the new system of telephone charges adopted in New York is called in Boston, and a good name it is. This service is to be measured out in the Hub hereafter.

At a recent meeting of the trustees of Far Rockaway, on Long Island, J. C. McGuire, Surveyor of the Port of New York and a Summer resident of this place, was granted a franchise to establish a telephone system there.

Boston seems to be greatly tickled over its new telephone exchange, the "Haymarket." There are 1,380 subscribers' drops and 280 trunk line drops in the new exchange, which is installed in a fireproof building specially built.

As telephone matters now stand in Lafayette, Ind., the citizens of that town have free use of the Central Union Exchange and pay half the old rate for the Harrison exchange service. The charges of the new company are $18 per year for residences and $30 for offices.

Mr. Stanley Bruen is asking for a telephone franchise at Penn Yan, N. Y. The following named business men are also interested: Edson Potter, Hanford Struble, H. D. Pratt, Samuel McMath and Edward Donahue. A maximum annual rate of $20 for business houses and $18 for residences has been decided upon.

The Cushman United Telephone Company has been incorporated in Chicago with a capital stock of $20,000,000. Its business will be the manufacturing of telephone appliances and the operation of telephone and telegraph exchanges. We thought Cushman would be heard from soon. Wonder if Superintendent Parker, of the Postal, is still hopeful.

The Joplin, Mo., Telephone Company has applied for a charter, all the stock having been subscribed. The gentlemen named as incorporators are: L. A. Fillmore, Z. H. Lowdermilk, Capt. D. Dwyer, J. W. Freeman and P. Harney. As soon as the charter is received a meeting of the stockholders will be called and the organization will be perfected. Nothing is yet known as to what system of telephones will be used.

The Tri-Village Telephone Company has been organized to serve Glens Falls, Sandy Hill and Fort Edward, N. Y. The commendable object is to furnish telephone connections between residences of the three villages. The directors of the new company are Marcus Allen, J. E. Howland, of Sandy Hill; Dr. Joseph E. King, F. B. Davis, G. C. Beverly, of Fort Edward; J. W. Hunting, J. I. Dunn, of Glens Falls.

Berlin and Vienna were connected by telephone hardly a month ago, and already there is business enough to need another line. The line has been connected with Trieste at one end and Hamburg at the other, making a total length of nearly 900 miles. It is expected that Hamburg will soon be connected with Copenhagen, which is joined to the Swedish system, extending 850 miles north, when it will be possible for northern Sweden and southern Austria to communicate by telephone.

The manufacturers of underground systems should watch Syracuse, N. Y. The Central New York Telephone and Telegraph Company have decided to put their wires under ground in that city, and the work will be begun early in the Spring. In addition to the subways and other improvements in the service, the company proposes to put up a building for its exclusive use. The structure will be fire-proof and five stories high. The site is very near the center of the telephone service of Syracuse. Work on the new building will be started soon.

The citizens of Binghamton, N. Y., are discussing telephone rates from three or four points of view. According to the new rate a telephone is placed in a building for $25 a year, but the subscriber has to pay an additional five cents for every call made. The sum of $40 per year gives a subscriber the privilege of 50 calls per month; all calls over this number are charged to him at a cost of five cents each; $60 per year carries with it the privilege of 75 calls per month. For $84 per year the subscriber secures unlimited use of the 'phone. Some are inclined to regard this plan as exceptionally fair, while there are those who believe that it is quite the reverse.

The Minneapolis *Times* under the expressive heading: "Did up the Bell People," gives the following news from Escanaba, Mich.: 'The Michigan Telephone and Telegraph Construction Company pulled out the Bell telephone in this city to-day, having been frozen out by a local telephone exchange recently established by a poor boy named Geo. W. Finch. A year ago the Bell people were doing a big business here. When they suspended operations here to-day they had less than 10 subscribers. Finch's exchange is giving splendid service and is very popular, chiefly because it succeeded in driving out the Bell." Poor Boy Finch seems to have struck a cinch.

The Phœnix Telephone Company rises up at Indianapolis and says it has 1,500 of the necessary 1,800 subscribers, and that an exchange is assured, the rental being $36 and $25. The Central Union charges $48 for business telephones and $36 for residence telephones within one mile from the exchange. The rate increases up to two miles at the rate of $6 a quarter mile. Beyond two miles special rates are made. Superintendent Baker says: "The present service is cheaper in Indianapolis than in any other city of its size in the country. Besides the service is as good as any service and much better than that in the large cities. The rates charged are as low as is compatible with good service. I do not believe that any company can give the service which the public demands for a lower rate than we have at present."

There was a stockholders' meeting of the Chicago Telephone Company at their offices in room 304, Ashland Block, Clark and Randolph streets, Chicago, on January 16. Henry B. Stone was re-elected president and the following as a board of directors: John De Koven, John B. Drake, Arthur G. Fuller, William A. Jackson, J. Russell Jones, Robt. T. Lincoln, C. H. Perkins, Henry B. Stone and Norman Williams.

The company's gross receipts were	$1,636,964.71
Expenses (69% of receipts)	1,128,888.21
Net earnings, 1894	$508,576.50
Dividends paid, 1894 (12%)	455,544.00
Surplus	$53,032.50
Capital stock outstanding	3,796,200.00

The vice-president, Norman Williams, and secretary, C. E. Mosley, were re-elected. This is the first year that this company has given any sort of financial report to the public. The stockholders, however, were usually given the opportunity of a personal inspection of the books.

Milo G. Kellogg is a big thorn in the side of the Central Union Telephone Company. Kellogg is a director of the company and about six months ago filed a petition for a mandamus to compel Henry B. Stone, the president of the corporation, and William S. Chapman, the secretary, to permit him to examine the records of the concern. In his petition Mr. Kellogg alleges that he heard rumors to the effect that certain officers and agents of the company were not administering its affairs in the interest of the stockholders, and he was desirous of making an investigation in order to ascertain the truth, but the officers refused to give him access to the books and minutes of the board of directors. President Stone filed an answer to the petition in which he alleged that the petitioner had not been denied access to any records which in law he had a right to examine. The answer also set up that Kellogg had been instrumental in bringing about the litigation to annul the Berliner telephone patent, and had been engaged in other investigations which were not to the interest of the company. The investigation which the petitioner proposed to make, the answer declared, was not in the interest of the stockholders, but was to promote the private ends of the petitioner. Kellogg filed a demurrer, denying that he was occupying a position adverse to the interests of the company. Judge Clifford took the case under advisement.

Boston Trolley Cars Burned.

A fire for which three alarms were sounded at midnight last Thursday was in the West End Street Railway's car house on Columbus avenue and Northampton street, Boston. The immense car house on Tremont street was threatened, and the cars that were in it were run out upon Tremont and Northampton streets. The fire destroyed the Columbus avenue house and ruined half a hundred cars. The car house was a wooden building encased in corrugated iron. That portion of it where the fire started was 50 feet wide by 200 by 50 feet. In it the cars of the Columbus and Huntington avenue lines were kept, and at the time the fire started there were 56 within. All of them were destroyed. The loss is estimated at $100,000; fully insured.

An Opportunity for the Light Engineer—Send Us Your Answers.

To the Editor of Electrical Review:

Will you kindly inform me, through the columns of your paper, how much floor space can be properly lighted by the average 16 candle-power incandescent lamp? Or else refer me to some article where I can find the necessary data, and oblige

Yours respectfully,

L. E. Lannan.

Lehigh University, Jan. 13, 1895.

ELECTRIC RAILWAY NOTES.

Officers of electric railway companies are requested to send promptly to the ELECTRICAL REVIEW *notices of meetings, election of officers, declarations of dividends, financial reports and all items of interest in connection with the financial and practical operation of their roads.*

An electric railway will be one of the early improvements in Hot Springs, South Dakota.

It is said the electric railroad between Oldtown and Bangor, Me., will be completed by August 1, 1895.

The street railways centering in New Haven paid $25,372.90 taxes to the State of Connecticut in 1894.

The car barn of the Lima, Ohio, Electric Street Railway Company was burned on January 12. Loss, $20,000; fully insured.

The Ft. Worth, Tex., Street Railway Company will spend $50,000 in improving and extending its line. Its track will be relaid with 56 pound steel rails.

Receiver Snow, of the Adrian, Mich., Electric Belt Railway Company, has received permission from the Circuit Court to borrow $9,000 with which to re-equip the road.

All the contracts for the electric railroad between Baltimore and Washington will have been given out before April 1. New York bankers are to take all the bonds of the road.

A company composed of Boston capitalists is now being formed for the purpose of constructing and operating an electric road between Norwich and New London, Conn. The capitalization will be $200,000.

It is said that the Brooklyn Street Railway Company tried to collect an additional fare for electrical treatment from the woman who received a shock while riding in a trolley car. —*New York Commercial Advertiser.*

Police Justice Taintor, of New York city, has decided that if a passenger in a street car drop his fare on the floor of the car while paying the conductor, it is the conductor's place to pick it up, and the passenger need take no further thought of it.

The Kings County Elevated Railway, of Brooklyn, N. Y., contemplates the trolley, and also passenger elevators at all stations, to be operated by electricity. Several electric companies have submitted propositions, but they have so far all been unsatisfactory.

Tucker & Anthony, of Boston, have purchased from the General Electric Company the Macon Consolidated Street Railway Company, of Macon, Ga. There are $300,000 bonds on this property and $500,000 stock. The stock has already been subscribed for by the clients of the banking house. Mr. William A. Tucker will take the treasurership of the road. The road has been in operation by electricity for about two years.

The Asheville, N. C., Street Railroad has been sold to satisfy a judgment of $900. The road was purchased by Charles A. Moore, and he was at once put in possession of the property by the sheriff, and J. G. Martin was appointed superintendent. The road is in full running order, embracing between six and seven miles of track, and operates 10 cars and covers every portion of the city. The road was owned by New York capitalists, and a hot legal fight is anticipated.

The electric railway company at Glens Falls, N. Y., has introduced an innovation in the method of paying some of its employés for the coming year. A premium system consisting of a percentage of the returns made by each conductor, and, in the case of the motorman, a share of the savings effected in car repairs, are the principal features. The system will, the officers of the road hope, aid in the efficiency of the service to the public, and at the same time enable the employés to make a substantial addition to their wages in proportion to their faithfulness to their duties.

Affidavits were filed in the Circuit Court at Fort Wayne, Ind., last Thursday by the prosecuting attorney for the arrest of five directors of the Fort Wayne Electric Railway Company for discharging R. J. Hollandsworth, one of their motormen, for being a member of a labor organization. A similar affidavit was filed against Loren McNutt, superintendent of the road, for discharging Cyrus J. Ward, a conductor. The suits are based on a State law which forbids corporations from discharging employés because of their connection with a labor organization. The suit is an echo of a strike which occurred on the line some time ago.

The year 1895 promises to be an important one in the development of electric railway interests in New Hampshire. The special report of the State Railroad Commissioners upon the subject of electric roads is awaited with considerable interest, they having many important matters in hand for action. Until this report is made no definite knowledge of the work projected can be obtained, but it is understood that quite a number of new charters will be applied for and several old ones again taken up. A line up the Merrimac Valley, from Lowell to Concord, is contemplated, and also one from Nashua to Manchester. It is also rumored that the old project of constructing a road from Manchester to Milford is being revived. Many short lines, consisting of extensions and spurs from roads already in operation, will probably be constructed in the Spring.

The Graphophone in a Boston Telephone Exchange.

The New England Telephone and Telegraph Company have recently adopted the use of the graphophone in their central exchange at Boston for the purpose of automatically notifying subscribers of other exchanges when the line they desire to use is already in operation.

A little circular notifying subscribers of this fact was sent out by the telephone company. The newspapers got hold of the information, and, as usual, romanced a little on the subject, the results causing considerable amusement for some days at the central office. A great many subscribers learning that the phrase used by the instrument would be, "Graphophone says line is busy; please call again," and thinking that it applied to any exchange with which they happened to be connected, gave the operators considerable extra work to do by sending in all manner of calls, simply for the pleasure of hearing the new machine talk, and were in most instances greatly disappointed by getting the usual brief response of "busy" in the musical but well-known voice of their non-automatic operator.

As a matter of fact, the graphophone is not in general use at all the exchanges of the company, but only at headquarters, on Milk street, and even here is used simply for expediting the rush of business from the two largest sub-exchanges.

A subscriber, therefore, connected directly with headquarters and desiring to talk with a party on another exchange, would not come into contact with the graphophone at all, it being used only to shut off calls from patrons of outside exchanges who desire connection with those connected with headquarters.

The operation of the new system is extremely simple. The operator on finding a line called for already in use, instead of using her own voice to notify the party sending in the call, merely switches him into circuit with the graphophone, which keeps grinding out the same old phrase over and over again. After thus quickly disposing of him, she is at liberty to devote her attention to the others who require her services. After the graphophone has had time to repeat its information several times in polite language, it is disconnected and stands ready to volunteer information to the next unfortunate.

The graphophone cylinders have to be changed every day, and the unfortunate females to whom the task of recharging them is assigned find that temporarily, at least, life has lost much of its attraction.

Several incipient cases of insanity have already developed, and lockjaw is one of the possibilities of the future. One individual who has not received information of the innovation, and who ran up against the graphophone unexpectedly, after listening to its dulcet tones repeating the same thing over and over again for about a minute, and without drawing breath, remarked to a friend as he hung up the instrument, "Great Scott, I'm glad I didn't marry that girl!" If he had seen the girl he probably would have had additional ground for congratulation.

New York Board of Electrical Control.

The New York Board of Electrical Control met in the Mayor's office last Thursday and elected Mayor Strong chairman and Commissioner Henry S. Kearney secretary. A resolution was adopted authorizing Secretary Kearney to appoint and remove all employés of the board at will; his action, however, to be subject to ratification by the full board. The secretary was also authorized to issue temporary permits for placing overhead wires in streets where there are no subways.

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CHICAGO.
BOSTON.
PHILADELPHIA.

The Berlin Iron Bridge Company, of East Berlin, Conn., are putting up a new retort for the Ellerslie Gas and Coke Company, at Winifred Junction, W. Va. The building is 66 feet wide and 84 feet long, with an iron roof covered with slate.

"The Tradesman," of Chattanooga, Tenn., issued its Annual Number XVI on January 1, 1895. This issue consists of 218 pages and contains articles from recognized authorities on subjects of special interest to the industries of the Southern States. It is a great number of a great trade paper.

The Garlock Packing Company, of Palmyra, N. Y., have recently established a New England branch with offices and salesrooms at 12 Pearl street, Boston, Mass. Mr. John D. Lane, for many years traveling salesman of the company, has been appointed general manager of the New England branch.

The Joseph Dixon Crucible Company, Jersey City, N. J., have issued a third and revised edition of their valuable pamphlet, entitled, "Graphite as a Lubricant." To those who do not know of the excellent lubricating qualities of graphite this pamphlet will prove a money-saver. Those who have seen previous editions will find much that is new in the third edition.

The Electric Storage Battery Company, of Philadelphia, has removed its New York offices from 45 Broadway to larger and more pleasant quarters in the Manhattan Life Insurance Company building at 66 Broadway. The change was necessitated by the company's increase of business. We congratulate Mr. Chas. Blizard, the company's sales agent, over this satisfactory state of affairs in his territory, where he has made the chloride accumulator so well known.

McKenney & Waterbury, 181 Franklin street, Boston, Mass., the well-known manufacturers of artistic gas and electric fixtures, are supplying a valuable device for the use of invalids and others. This is the aluminum Merrill heater, which can be used with an argand gas burner or an oil lamp. It is set on top of the chimney and is so constructed that the distribution of the hot air and the heat radiation are utilized to the best advantage. It is especially effective for warming rooms and heating hot water, and will not break the chimney nor cause soot or bad odors.

Garlock's Waterproof Hydraulic Packings.

The constant demand for a superior packing for the plungers and pistons of pumps, pumping and hydraulic machinery, induced the Garlock Packing Company, of Palmyra, N. Y., manufacturers of the Garlock packings, to produce a packing which would meet all requirements, and after many years of experiments and at a considerable expense, they have succeeded in producing a waterproof hydraulic packing which is sure to answer all purposes. This packing is the outcome of numerous experiments and practical tests in the water ends of pumps, plungers, pump pistons and hydraulic elevators and hydraulic machinery, and with the results that fully justify their claim that they have produced a first-class

waterproof packing for light or heavy duty, made of the best flax and thoroughly lubricated with a waterproof compound, which is strictly free from acid. This packing is made in all sizes up to two inches.

Heretofore the best rawhide hydraulic packing answered the purpose well for a time, but soon became water-soaked and soft from the use of oils, losing its strength, and piston plungers were sure to leak badly, requiring constant repacking. This packing is intended to resist excessive pressures and retain its solidity. One of their principal claims for this packing is that it is absolutely waterproof and oilproof. Engineers who daily experience the difficulties of leaky pump plungers will no doubt greatly appreciate the advent of this packing.

An Electrical Rapping and Talking Table.

It is characteristic of the present age that machinery and apparatus are everywhere taking the place of the unaided human hands, and this is true even in the domain of the parlor magic, where pure sleight-of-hand is being replaced by elaborate tricks requiring costly and delicate devices. It is not often that the amateur may avail himself of these, but in a recent number of *Der Stein der Weisen*, Vienna, is described an ingenious piece of electrical apparatus that is within the power of any clever workman to construct. The following translation of the description is from the *Literary Digest*:

The varied applications of electricity in the present day surely put to the blush the deeds of wonder of the old magicians, as well as those of the modern prestidigitator. In the following paragraphs a piece of electric apparatus for an entertainment in parlor-magic will be described, namely, a rapping and talking table. It is an ordinary small table or stand with a rather strong top, having in the middle a circular hollow surrounded by a ring-shaped one. The whole is covered with a plate of wood about one-eight of an inch thick. The foot of the table is hollow, and has at its lower end a little chamber in which is hidden a Leclanche element, and which is accessible by means of a lid. From the battery two wires lead to two springs; these again press against two half rings of metal, which are so fastened inside the top of the chamber that when the element is in action there will be an electrical contact with them. They are in connection with two wires that lead from the foot of the table upward. One of these wires is connected to a notched metal ring that lies in the ring-shaped hollow on the table-top; the other connects with one end of an electro-magnet coil in the middle of the table-top. The other end of this coil is in electrical contact with a flat metal ring that is fastened to the thin wooden cover of the table-top directly over the notched ring, without touching it. If the open hand be now placed on the thin wooden layer directly over the two rings, the electric circuit will be closed and the electro-magnet will attract its armature, which is fastened to the thin layer. This makes a loud rap, and when the circuit is broken there is another rap. Of course the movement of hand must not be perceptible.

Each of the wires that lead upward through the leg of the table is also connected with a longer wire that leads through the lower end of the leg. Both of these are so arranged that they may be led underneath a carpet or rug and connected to a telephonic transmitter in another room. If the transmitter be now spoken to, the table will serve as a telephonic receiver and reproduce the words, of course, much to the mystification of the uninitiated

LITERARY.

A murder and robbery committed in an express car on the Rock Island Railroad some years ago gave the detectives one of the hardest cases they have ever had to deal with. The Pinkerton detective story in *McClure's Magazine* for February will be a history of this crime, and of the ingenious and patient methods by which the perpetrators were finally brought to arrest and conviction.

WOVEN WIRE BRUSHES.

The Belknap Motor Co., of Portland, Maine, are the patentees and manufacturers of the best woven wire commutator brush on the market.

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